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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/668,159	09/24/2003	Gang Xie	243223US3	2774

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EXAMINER

GOFF II, JOHN L

ART UNIT	PAPER NUMBER
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1733

DATE MAILED: 03/30/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/668,159

Applicant(s)

XIE ET AL.

Examiner

John L. Goff

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 13 January 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-17 is/are pending in the application.
- 4a) Of the above claim(s) 1-4 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 6-17 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 24 September 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
- 1) ☒ Certified copies of the priority documents have been received.
 - 2) ☐ Certified copies of the priority documents have been received in Application No. _____.
 - 3) ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 1/13/06
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

1. This action is in response to the amendment filed on 1/13/06.
2. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

4. Claims 5-17 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

5. Claims 5 and 9 require "wherein the porous gas diffusion layer comprises carbon cloth or carbon paper having electrically conductive particles and water repellant particles dispersed throughout the layer". The specification discloses the porous gas diffusion layer comprises carbon cloth or carbon paper, electrically conductive particles, and water repellant particles (Page 4, lines 33-34 and Page 5, lines 1-8 and Page 15, lines 17-19). The specification does not disclose the particles are "dispersed throughout the layer". It is suggested applicants delete "dispersed throughout the layer" from the claims to overcome the rejection.

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6. Claim 14 requires “the porous gas diffusion layer comprises at least about 33 wt% of water repellant particles based on the total amount of water repellant particles and electrically conductive particles”. The specification discloses forming a solution comprising 300g of carbon black, i.e. electrically conductive particles, and 150g of PTFE, i.e. water repellant particles, and infiltrating a carbon paper with the solution to form a porous gas diffusion layer (Page 4, lines 33-34 and Page lines 1-8). The specification does not disclose the porous gas diffusion layer comprises at least about 33 wt% of water repellant particles based on the total amount of water repellant particles and electrically conductive particles. It is suggest applicants amend claim 14 with the specific language in the specification to overcome the rejection.

7. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

8. Claims 5-17 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

9. Claims 5 and 9 require “wherein the porous gas diffusion layer comprises carbon cloth or carbon paper having electrically conductive particles and water repellant particles dispersed throughout the layer”. The specification does not disclose the particles are “dispersed throughout the layer” or what is required by the phrase. The specification does disclose the particles “infiltrate” the layer (Page 5, lines 6-8), and this is the interpretation given the phrase by the examiner. It is suggested applicants delete “dispersed throughout the layer” from the claims to overcome the rejection.

Claim Rejections - 35 USC § 102/103

10. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

11. Claims 5-17 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Kunisa et al. (U.S. Patent Application Publication 2002/0098407) as evidenced by Kerr et al. ("New Polyelectrolyte Materials for High-Temperature Fuel Cells").

Kunisa et al. disclose a process for forming an electrode for a fuel cell comprising providing porous gas diffusion layers comprising carbon cloth or carbon paper infiltrated with electrically conductive particles and water repellant particles (Paragraphs 19, 22, and 47), directly coating the gas diffusion layers with a mixture of electrolyte polymer having ion conductivity such as NAFION and conductive miniature bodies coated with catalyst such as carbon having platinum supported thereon, baking the coated gas diffusion layers under an inert gas atmosphere without applied pressure at a temperature lower than the thermal decomposition temperature of the electrolyte polymer such as at 120 to 180 °C, sandwiching an electrolyte membrane having ion conductivity between two baked gas diffusion layers, and hot-pressing the layers to form the electrode (Figure 1 and Paragraphs 28, 30, and 46-52). Kunisa et al. do not

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specifically note the baking occurs at a temperature above the glass transition temperature of the electrolyte polymer. However, as evidenced by Kerr et al. the glass transition temperature of NAFION is 110 to 115 °C such that clearly it is inherent that the baking as taught by Kunisa et al. occurs at a temperature above the glass transition temperature of the electrolyte polymer. Furthermore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to perform the baking taught by Kunisa et al. at a temperature above the glass transition temperature of the electrolyte polymer as this is the temperature that must be reached to cause the electrolyte polymer to flow and disperse within the porous gas diffusion layer.

Regarding claims 8, 10, and 13, Kunisa et al. do not specifically note the time and temperature for baking is greater than the time and temperature for hot-pressing. However, baking as known to one of ordinary skill in the art is a process for causing the electrolyte polymer to flow and disperse within the porous gas diffusion layer as opposed to hot-pressing which is a simple lamination of the baked gas diffusion layers and an electrolyte membrane such that inherently baking would require a greater processing time and temperature than hot-pressing. Furthermore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to experimentally determine the appropriate baking and hot-pressing times and temperatures as a function of the particular materials in the electrode and the difficulty in dispersing the electrolyte polymer as doing so would have required nothing more than ordinary skill and routine experimentation.

Regarding claim 14, Kunisa et al. do not specifically note the total amount of water repellent particles in relation to the total amount of water repellent particles and electrically

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conductive particles. However, Kunisa et al. teach the porous gas diffusion layers include sufficient water repellant particles for making the layers water repellant such that it appears inherent the gas diffusion layer in Kunisa et al. would include the claimed amount of water repellant particles (Paragraph 25). Furthermore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to experimentally determine the amount of water repellant particles as a function of the water repellency of the gas diffusion layers as doing so would have required nothing more than ordinary skill and routine experimentation.

Kerr et al. is applied only as evidence of an inherent property, i.e. the glass transition temperature of NAFION is 110 to 115 °C (See Page 368, Column 1, lines 5-6).

Response to Arguments

12. Applicant's arguments with respect to claims 5-17 have been considered but are moot in view of the new ground(s) of rejection.

Applicants argue, "The processes of the present application are distinguishable from the process disclosed in US '407 because the steps involved in the presently claimed processes give rise to a physically different MEA. For example, an MEA prepared by the processes of the present application contain five layers (see Fig. 1 above), in which the gas porous layer 111 has both electrically conductive particles and water repellant particles dispersed throughout the layer. This is unlike the seven-layered MEA prepared according to US '407 (see Fig. 2 on page 13 of the present response), in which the gas porous layer 11 has electrically conductive particles and water repellant particles coated on the surface of the layer having a slight amount dispersed near the surface thereof."

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In both Kunisa et al. and applicants method a gas diffusion layer is formed by infiltrating a carbon paper with water repellant particles and electrically conductive particles, coating the gas diffusion layer with a catalyst layer, and sandwiching an electrolyte membrane between two gas diffusion layers to form a five layer MEA.

Applicants further argue, "Applicants do not impregnate the intermediate lamination layer body 1 with a solution containing the solvent-soluble fluorine-containing polymer having no ion exchange group immediately before the heat treatment of the intermediate lamination layer body 1."

The claims are not commensurate in scope with this argument.

Conclusion

13. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

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14. Any inquiry concerning this communication or earlier communications from the examiner should be directed to **John L. Goff** whose telephone number is (571) 272-1216. The examiner can normally be reached on M-F (7:15 AM - 3:45 PM).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Richard Crispino can be reached on (571) 272-1226. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



John L. Goff



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